

AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A wireless signal switching circuit for switching a plurality of transmitter and receiver signals having different frequencies in wireless communication for communication by at least a first communication system and a second communication system, comprising:

an antenna terminal (11) connected to an antenna (ANT);

a first signal route switching means (20) having a plurality of switch means (21, 23, 24, 60) for selecting a plurality of transmitter and receiver signals having different frequencies in the first communication system, the different frequencies including at least a second frequency and a third frequency (F2, F3);

a phase rotating means (40) having one end (40a) connected to the antenna terminal (11) and imparting a phase rotation of 90 degrees to the phase of the signal of the frequency component supplied to the first signal route switching means (20); and

a second signal route switching means (30) having a diplexer (31) for separating the transmitter and receiver signals having a first frequency (F1) of the second communication system lower than the first and second frequencies (F2, F3) of the first communication system and the transmitter and receiver signals of the first communication system, a common input and output terminal (31a) of the diplexer (31) being connected to the other end (40b) of the phase rotating means, a first filter side terminal (31b) of the diplexer (31) being supplied with transmitter and receiver signals having the first frequency (F1) of the second communication system, and a second filter side terminal (31c) of the diplexer (31) being supplied with transmitter and receiver signals of the second communication system, and

an inductor (41) being connected between the one end (40a) connected to the antenna terminal (11) and the other end (40b) connected to the diplexer (31) in the second routing means (30), and

wherein the phase rotating means comprises:

the inductor (41) having the other end (40b) connected to the common input and output terminal (31a) of the diplexer (31),

a first capacitor (42) connected between one end of the inductor (41) and a reference potential node,

a second capacitor (43) connected between the other end of the inductor and the reference potential node,

a first switch means (44, 60) having one end connected to the other end of the inductor (41), and

a third capacitor (45) connected between the other end of the first switch means (44, 60) and the reference potential node, and

has the characteristics

that a circuit defined by the inductor (41) and the first to third capacitors (42, 43, 45) imparts a phase rotation of 90 degrees to the phase of the signal of the frequency component supplied to the first signal route switching means (20) when the first switch means is activated and

that a circuit defined by the inductor (41) and the first and second capacitors (42, 43) attenuates the harmonic component of the signal transmitted by the second communication system when the first switch means is de-activated.

2. (Original) A wireless signal switching circuit as set forth in claim 1, wherein
the phase rotating means has a characteristic of attenuating harmonic components of
signals transmitted by the second communication system.

3. (Original) A wireless signal switching circuit as set forth in claim 1, wherein
the first filter side of the diplexer (31) is a low frequency filter side, and the second
filter side of the diplexer (31) is a high frequency filter side.

4. (Cancelled).

5. (Previously Presented) A wireless signal switching circuit as set forth in claim 1,
wherein
the first communication system is a triple band GSM system, and
the second communication system is a UMTS system.

6. (Previously Presented) A wireless signal switching circuit as set forth in claim 5,
wherein the first signal route switching means (20) comprises:
a first receiver signal switching circuit connected to the antenna terminal (11) and
having a plurality of switch means (23, 24) for selecting receiver signals (F2RX or F3RX) having a
the different frequencies including at least the second frequency and the third frequency (F2, F3) in
the first communication system and

a first transmitter signal switching circuit connected to the antenna terminal (11) and having a switch means (22) for selecting transmitter signals (F2 or F3TX) having the different frequencies including at least the second frequency and the third frequency (F2, F3) in the first communication system and a filter means connected to the switch means.

7. (Previously Presented) A wireless signal switching circuit as set forth in claim 1, wherein the second signal route switching means (30) has a switch means (32) connected to the first filter side terminal (31b) of the diplexer (31) and selecting a transmitter signal having a further different frequency (F1) of the first communication system and a switch means (33) for selecting a receiver signal having the first frequency (F1) of the second communication system.

8. (Currently Amended) A wireless communication apparatus comprising:

a wireless transmitter and receiver antenna (ANT) and

a wireless signal switching circuit as set forth in any one of claims 1, 2, 3, 5, 6, and 7 for switching a plurality of transmitter and receiver signals having different frequencies in wireless communication for communication by at least a first communication system and a second communication system, the wireless signal switching circuit comprising:

an antenna terminal (11) connected to an antenna (ANT);

a first signal route switching means (20) having a plurality of switch means (21, 23, 24, 60) for selecting a plurality of transmitter and receiver signals having different frequencies in the first communication system, the different frequencies including at least a second frequency and a third frequency (F2, F3);

a phase rotating means (40) having one end (40a) connected to the antenna terminal (11) and imparting a phase rotation of 90 degrees to the phase of the signal of the frequency component supplied to the first signal route switching means (20); and

a second signal route switching means (30) having a diplexer (31) for separating the transmitter and receiver signals having a first frequency (F1) of the second communication system lower than the first and second frequencies (F2, F3) of the first communication system and the transmitter and receiver signals of the first communication system, a common input and output terminal (31a) of the diplexer (31) being connected to the other end (40b) of the phase rotating means, a first filter side terminal (31b) of the diplexer (31) being supplied with transmitter and receiver signals having the first frequency (F1) of the second communication system, and a second filter side terminal (31c) of the diplexer (31) being supplied with transmitter and receiver signals of the second communication system, and

an inductor (41) being connected between the one end (40a) connected to the antenna terminal (11) and the other end (40b) connected to the diplexer (31) in the second routing means (30), and

wherein the phase rotating means comprises:

the inductor (41) having the other end (40b) connected to the common input and output terminal (31a) of the diplexer (31),

a first capacitor (42) connected between one end of the inductor (41) and a reference potential node,

a second capacitor (43) connected between the other end of the inductor and the reference potential node,

a first switch means (44, 60) having one end connected to the other end of the inductor (41), and
a third capacitor (45) connected between the other end of the first switch means (44, 60) and the reference potential node, and
has the characteristics
that a circuit defined by the inductor (41) and the first to third capacitors (42, 43, 45) imparts a phase rotation of 90 degrees to the phase of the signal of the frequency component supplied to the first signal route switching means (20) when the first switch means is activated and
that a circuit defined by the inductor (41) and the first and second capacitors (42, 43) attenuates the harmonic component of the signal transmitted by the second communication system when the first switch means is de-activated.

9. (Original) A wireless communication apparatus as set forth in claim 8, wherein:

the wireless communication apparatus is a mobile wireless communication apparatus including a dual mode compatible mobile phone of a triple band GSM system as the first communication system and a UMTS system as the second communication system.

10. (Previously Presented) A wireless communication apparatus as set forth in claim 8, wherein:

the second filter side terminal of the diplexer is connected to a front end of a UMTS use transmission and reception circuit, and

the front end has:

a duplexer (561) for switching the UMTS transmitter signal and UMTS receiver signal,

a low noise amplifier circuit (562) for amplifying the UMTS receiver signal input through this duplexer, and

a power amplifier circuit (563) for amplifying the UMTS transmitter signal.

11. (Previously Presented) A wireless signal switching circuit as set forth in claim 5, wherein the second signal route switching means (30) has a switch means (32) connected to the first filter side terminal (31b) of the diplexer (31) and selecting a transmitter signal having a further different frequency (F1) of the first communication system and a switch means (33) for selecting a receiver signal having the first frequency (F1) of the second communication system.

12. (Previously Presented) A wireless signal switching circuit as set forth in claim 6, wherein the second signal route switching means (30) has a switch means (32) connected to the first filter side terminal (31b) of the diplexer (31) and selecting a transmitter signal having a further different frequency (F1) of the first communication system and a switch means (33) for selecting a receiver signal having the first frequency (F1) of the second communication system.

13. (Cancelled).

14. (Cancelled).

15. (Cancelled).

16. (Cancelled).

17. (Cancelled).

18. (Cancelled).

19. (New) A wireless communication apparatus as set forth in claim 8, wherein
the phase rotating means has a characteristic of attenuating harmonic components of
signals transmitted by the second communication system.

20. (New) A wireless communication apparatus as set forth in claim 8, wherein
the first filter side of the diplexer (31) is a low frequency filter side, and the second
filter side of the diplexer (31) is a high frequency filter side.

21. (New) A wireless communication apparatus as set forth in claim 8, wherein
the first communication system is a triple band GSM system, and
the second communication system is a UMTS system.

22. (New) A wireless communication apparatus as set forth in claim 21, wherein the first
signal route switching means (20) comprises:

a first receiver signal switching circuit connected to the antenna terminal (11) and having a plurality of switch means (23, 24) for selecting receiver signals (F2RX or F3RX) having the different frequencies including at least the second frequency and the third frequency (F2, F3) in the first communication system and

a first transmitter signal switching circuit connected to the antenna terminal (11) and having a switch means (22) for selecting transmitter signals (F2 or F3TX) having the different frequencies including at least the second frequency and the third frequency (F2, F3) in the first communication system and a filter means connected to the switch means.

23. (New) A wireless communication apparatus as set forth in claim 8, wherein the second signal route switching means (30) has a switch means (32) connected to the first filter side terminal (31b) of the diplexer (31) and selecting a transmitter signal having a further different frequency (F1) of the first communication system and a switch means (33) for selecting a receiver signal having the first frequency (F1) of the second communication system.

24. (New) A wireless communication apparatus as set forth in claim 22, wherein the wireless communication apparatus is a mobile wireless communication apparatus including a dual mode compatible mobile phone of the triple band GSM system as the first communication system and the UMTS system as the second communication system.

25. (New) A wireless communication apparatus as set forth in claim 23, wherein the wireless communication apparatus is a mobile wireless communication apparatus including a dual

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mode compatible mobile phone of a triple band GSM system as the first communication system and
a UMTS system as the second communication system.